

A NEW SPECIES OF FILARIAL LARVA FOUND IN THE SKIN OF NATIVES IN THE GOLD COAST

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When investigating the occurrence of larvae of *Onchocerca volvulus* in the skin of natives in the Gold Coast, sheathless larvae of another species of Filariidae were found in several cases. So far as we are able to ascertain these larvae have not previously been noted, and, therefore, notwithstanding the fact that we have not yet discovered the adults, a brief description of them is given here.

The larvae were found in the skin of nine out of twenty-four cases selected for examination for *O. volvulus* larvae either because they had tumours, or because the skin showed the conditions which have been associated with that infection. From each of these cases a piece of skin, about half a square centimeter, was removed from the small of the back and placed in a tube containing normal saline solution. The larvae, which were found in the deposit which collected at the bottom of the tubes, were fixed by adding Ruge's solution to some of the deposit on a slide, allowed to dry, and subsequently stained with haemalum. The larvae were also found in the skin of the forearm and back in one out of nine unselected autopsies. In this case the larvae were fixed on a slide by heating, dried, and stained with eosin-azur.

The description of the larva which follows is based on the examination of specimens from these ten cases. Seventy-two larvae were measured, ten from each case in which this number could be found, and all that were available in the others. It may be noted here that there was a certain degree of variation in the size of the larvae in different cases, in some they were on the average slightly larger than in others.

MORPHOLOGY. The larvae are sheathless, slender, tapering both anteriorly and posteriorly, and when fixed assume a characteristic form, the body being straight, or nearly so, excepting at the posterior extremity, which is curved round like the handle of a walking-stick (see fig. 1, A). The cuticle is striated. The nuclei are

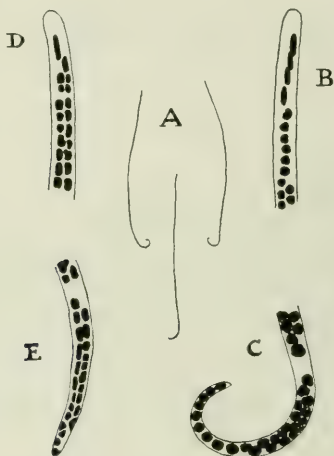


FIG. 1.—A. The larvae, \times c. 150, to show the general form; B and C. The anterior and posterior extremities \times c. 1375; D and E. The anterior and posterior extremities of the larva of *Ac. persians*, \times c. 1375, for comparison with B and C.

rather large, two or three abreast in the middle of the larva, and completely fill the greater part of the body.

Length. The lengths of the seventy-two larvae measured ranged from 180μ to 240μ , average 215.5μ . The table shows that nearly 60 per cent. were between 210μ and 229μ .

Breadth. The breadth at the widest part of the body is about 3μ .

Anterior extremity. The body tapers very slightly towards the anterior extremity, and is bluntly rounded at its end. No 'fang' could be distinguished. The clear area at the anterior end is about 4μ long. The column of nuclei commences with a single row of ten

or twelve nuclei, the first four being usually oval and the others somewhat quadrate.

The distribution according to lengths, and to the position of the nerve ring, of seventy-two of the filarial larvae.

Lengths, in microns		Nerve Ring : distance from anterior extremity, in microns.	
180 μ to 189 μ	5	40 μ to 44 μ	—
190 μ to 199 μ	6	45 μ to 49 μ	2
200 μ to 209 μ	7	50 μ to 54 μ	17
210 μ to 219 μ	22	55 μ to 59 μ	28
220 μ to 229 μ	21	60 μ to 64 μ	22
230 μ to 239 μ	10	65 μ to 69 μ	2
240 μ to 249 μ	1	70 μ to 74 μ	1

Other anatomical fixed points. The nerve ring is situated about 26.9 per cent. of the length from the anterior extremity: it is a well marked break, in the middle of which is a single, prominent nucleus. In the seventy-two individuals measured, its position varied from 48 μ to 71 μ , average 58 μ from the anterior extremity. The excretory pore is small, and is situated about 34.1 per cent. of the length from the anterior extremity; the excretory cell lies slightly more posteriorly. The G₁ cell, which is not always easily recognised, is large, with a round nucleus, and situated about 69.2 per cent. of the length from the anterior extremity. The anal pore is a small break in the column of nuclei situated about 86.2 per cent. of the length from the anterior extremity. A central viscus was not seen.

Posterior extremity. The body tapers for a considerable distance towards the posterior extremity, and the extreme tip of the tail, beyond the last nucleus, is abruptly pointed so that the posterior clear area is at most about 1 μ long. The tail is curved sharply into a crook, and the column of nuclei at its extremity is a single row of rounded, or at most oval, nuclei.

SITES WHERE THE LARVAE WERE FOUND. The larvae were found only in the skin. The part examined in nine of the cases was the

small of the back, and in one case the right forearm and the back between the blades of the scapulae. In the latter case skin from the abdomen near the umbilicus and from the middle of the outer side of the calf of the left leg were also examined, but no larvae were found in these situations. In nine cases six or more blood films from the finger and from the back (near to the spot where larvae were found in the skin) were examined; and in two of these four thick films taken at night, and in two others 3 c.c. of blood taken during the day, were also examined. In none of these specimens were the larvae found. Larvae of *Acanthocheilonema ferstans*, however, were found in two.

In one post-mortem examination in which the larvae were found in the skin of the small of the back, the following parts of the body were also examined, but without discovering any larvae: skin of scalp above the right ear, skin of right wrist, skin of left ankle, skin of scrotum, mucous membrane of the mouth, rectum, lung, aorta, liver, spleen, cerebral cortex of brain, cerebellum, and lymphatic glands along the aorta, in the mesentery, and in the right inguinal region.

Sections of the skin showed the larvae lying in the tissue spaces of the cutis vera or corium, usually close to the rete mucosum. There was present in all the cases examined a slight degree of cellular infiltration, especially round the blood vessels, but with this exception no definite departure from the normal condition was observed.

PATHOGENICITY. Our observations, which were made in the course of an investigation of volvulosis, do not admit of any statement being made as to the effects which may be caused by infection with this parasite. It may be noted, however, that the condition of the skin known as 'lichenification' was present in six of the ten cases examined, and a definite thickening in two others. Larvae of *O. volvulus* were present in the skin of five cases, but were absent from four of the six which showed 'lichenification.' It is, therefore, possible that the presence of the larvae in the skin may cause irritation and lead to pathological changes.

INCIDENCE. In order to gain some idea of the prevalence of this filarial infection in the Gold Coast, fifty men, taken at random, were examined at Accra. All the subjects were adults between the

ages of 25 and 45 years, who appeared to be in good health. The examinations were made between 9.45 and 10.15 a.m. on the 24th of October, 1922.

From each man a small piece of skin, similar to those taken for skin-grafting by Reverdin's method, was removed from the small of the back and placed in a tube containing about 2 c.c. of normal saline solution. The piece of skin was subsequently teased up

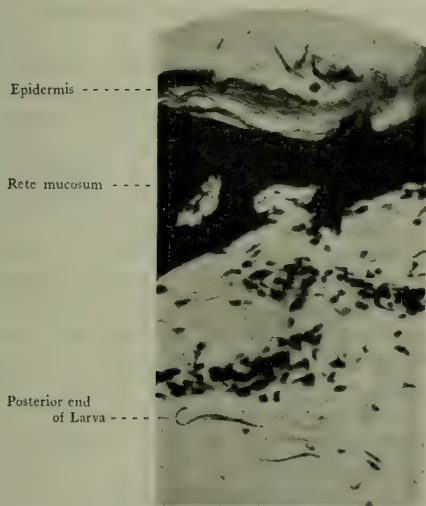


FIG. 2.—Photo-micrograph of section of skin to show the position of the larvae.

together with a drop or two of the saline solution from the bottom of the tube, the preparation fixed by heating, dried, and stained with haemalum. In no case was there obvious blood in the specimen.

The result of this examination was that filarial larvae of the species here described were found in twenty-two of the men (equal to 44 per cent.). It may be noted, moreover, that larvae of

O. volvulus were found in seventeen (equal to 34 per cent.), and that in eight of these cases the other larva was also present.

PERIODICITY. Ten of the men referred to above, in whom the larvae had been found, were re-examined two days later at about 9 p.m. No sensible difference suggesting periodicity in the prevalence of the larvae in the skin was observed.

DIAGNOSIS. The larva may be distinguished at a glance from that of *O. volvulus*, which also occurs commonly in the skin, by its slender body, crook-shaped posterior extremity, and blunt tail. In some respects it resembles the larva of *Filaria demarquayi*, but, apart from the fact that it apparently does not occur in the blood, it differs in that the tail is blunt, not sharply pointed, and that the column of nuclei extends practically to the tip of the tail.

The larva from which it has to be distinguished most carefully is that of *Ac. perstans*, which also is sheathless and striated and has a stumpy tail to the tip of which the column of nuclei extends, and which occurs in the blood, but may also be found in small pieces of skin removed in the manner described. The descriptions of the larva of *Ac. perstans* which we have been able to find are somewhat meagre, and do not agree in every respect. For example, Stephens (1916) gives the following measurements, length 160μ to 210μ , breadth 5μ to 6μ , nerve ring 34μ , excretory pore 49μ , genital pore 125μ , and notes that smaller larvae occur measuring 90μ to 110μ by 4μ ; Rousseau (1919) gives, length 145μ to 185μ , breadth 3.5μ to 5μ , nerve ring 25 per cent., excretory pore 32 per cent., G I cell 60 per cent., and anal pore 84 per cent.; and Johnston (1914) gives, length 83μ to 170μ , nerve ring 23.2 per cent., excretory pore 32.9 per cent., G I cell 62.6 per cent., and anal pore 83.5 per cent.

In order to obtain comparable data, twenty larvae of *Ac. perstans*, fixed and stained in the same manner as the other larvae, were measured by us. In these specimens the length varied from 158μ to 214μ , average 179.4μ , breadth 2.5μ to 5μ , and the approximate positions of the nerve ring, excretory pore, G I cell, and anal pore in a larva of the average length (179.4μ) were respectively 22.5, 32.7, 62.3, and 81.1 per cent. of the length from the anterior extremity.

The larva of *Ac. perstans* is, therefore, shorter than the larva described in this paper, relatively stouter, and the nerve ring, the

G 1 cell, and the anal pore are situated more anteriorly. When fixed in the manner described, it is, moreover, straight and not crook-shaped at its posterior extremity, and the column of nuclei at the anterior end is not reduced to a row of ten to twelve nuclei in single file.

For the new parasite we propose the name *Agamofilaria streptocerca*.

REFERENCES

- JOHNSTON, J. E. L. (1914). Observations on Variations in Form of Microfilariae found in Man. *Ann. Trop. Med. & Parasitol.*, Vol. VIII, pp. 73-79.
- ROUSSEAU, L. (1919). Filariose au Cameroun. *Bull. Soc. Path. Exot.*, Vol. XII, pp. 35-51.
- STEPHENS, J. W. W. (1916). In 'The Animal Parasites of Man,' p. 416. John Bale, Sons and Danielsson. London.